

SELF-SCRUBBING COAL - AN INTEGRATED APPROACH TO CLEAN AIR

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I. INTRODUCTION

On October 29, 1992, a Cooperative Agreement was executed by the United States Department of Energy (DOE) and Custom Coals Corporation (CCC). This agreement provides for the design, construction and operation of a coal preparation facility to produce Carefree Coal and Self-Scrubbing Coal, two fuels that will provide many United States utilities the opportunity to achieve compliance with the 1990 Clean Air Act Amendments (CAAA) without incurring major expenditures for power plant modifications.

Carefree Coal is coal cleaned in a proprietary dense-media cyclone circuit, using ultrafine magnetite slurries, to remove noncombustible material, including up to 90% of the pyritic sulfur. Deep cleaning alone, however, cannot produce a compliance fuel from coals with high organic sulfur contents. In these cases, Self-Scrubbing Coal will be produced. Self-Scrubbing Coal is produced in the same manner as Carefree Coal except that the finest fraction of product from the cleaning circuit is mixed with limestone-based additives and briquetted. The reduced ash content of the deeply-cleaned coal will permit the addition of relatively large amounts of sorbent without exceeding boiler ash specifications or overloading electrostatic precipitators. This additive reacts with sulfur dioxide (SO₂) during combustion of the coal to remove most of the remaining sulfur. Overall, sulfur reductions in the range of 80-90% are achieved.

After nearly 5 years of research and development of a proprietary coal cleaning technology coupled with pilot-scale validation studies of this technology and pilot-scale combustion testing of Self-Scrubbing Coal, CCC organized a team of experts to prepare a proposal in response to DOE's Round IV Program Opportunity Notice for its Clean Coal Technology Program under Public Law 101-121 and Public Law 101-512. The main objective of the demonstration project is the production of a coal fuel that will result in up to 90% reduction in sulfur emissions from coal-fired boilers at a cost competitive advantage over other technologies designed to accomplish the same sulfur emissions and over naturally occurring low sulfur coals.

II. PROJECT DESCRIPTION

The Demonstration Project, called the Laurel Facility, consists of a 500 TPH state-of-the-art, coal preparation plant and various product and raw coal handling and storage facilities. During the current project operations phase, the advanced coal cleaning cyclone and various ancillary magnetite recovery schemes are being demonstrated as well as the demonstration of combustion of the Carefree Coal and Self-Scrubbing Coal at full size power plant boilers.

Goals

CCC's goal for the project is to successfully commercialize its first plant and use that success to build a merchant coal preparation business. DOE's goal is to ensure the long term availability of a low cost, environmentally friendly fuel for our nation's long term energy needs.

Participants

The Project Team assembled to carry out the demonstration project includes:

- DOE's Project Management Team from PETC
- Custom Coals Corporation (CCC), overall project manager and lessee of patents for the technology
- Affiliated Engineering Technologies, Inc., design contractor
- Riggs Industries, Construction Managers
- Richmond Power & Light, utility host site
- Centerior Energy, utility host site
- Pennsylvania Power & Light, utility host site

III. PROJECT STATUS

- Design and construction of the facilities was completed in early 1996. Start-up began in late December 1995 and the first coal was processed on February 22, 1996. The plant circuits were fed an increasing amount of throughput and various adjustments to water and media flows were made until, in May of 1996, the facility reached its design capacity. Equipment and circuit optimization testing began immediately thereafter and have continued throughout the remainder of the year.
- One of the test burns, the Carefree Coal test at Pennsylvania Power and Light's Martins Creek Station, was conducted in mid-November. Although several of the plant circuits were performing below the expected proficiency because optimization has not been completed, the overall plant product produced for the test was consistent with the current quality of the plant feed coal.
- The later sections will detail the Start-up, the Circuit Optimization and the Equipment Performance work completed to date and provide the team's plans for completing the demonstration program.
- The project, as approved through Budget Period 3, calls for a total cost of \$87,386,102, with DOE providing \$37,994,437 or 43.5% of the funds. The project is expected to be completed in June 1997.